

Radio Science and Astronomy via the Universal Space Transponder

Completed Technology Project (2015 - 2018)



Project Introduction

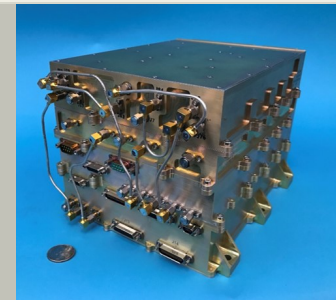
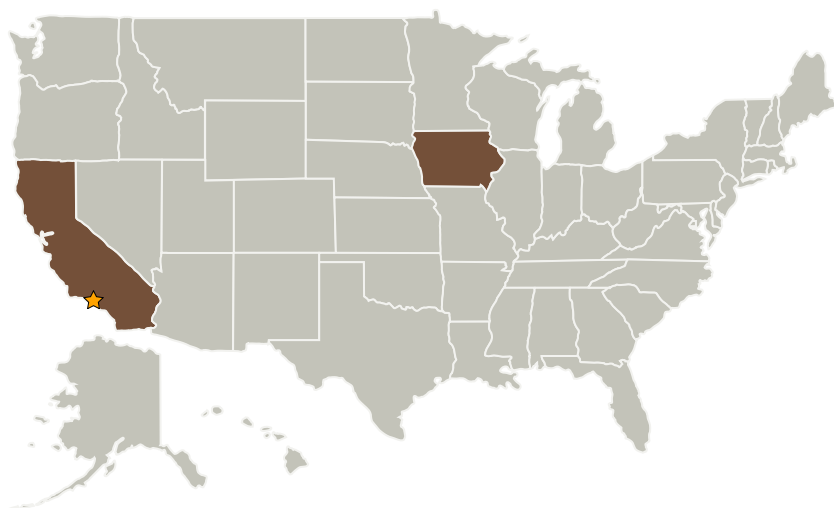
Augmenting JPL's next generation radio family, the Universal Space Transponder, with modules capable of advance radio science functions. This will allow future missions to perform additional science, such as bistatic radar and planetary radio astronomy, without the costs of full stand alone instruments.

The primary objective of this task is to demonstrate that it is feasible to augment the Universal Space Transponder (UST) product line with more advanced science capabilities that are extensible to many use cases. The UST is a next-generation software defined radio, currently in engineering model (EM) development. The architecture of the UST is designed expressly to be modular, with a stacked slice hardware design that enables accommodation of multiple frequency bands as well as software and firmware based functionality that are fully reprogrammable post-launch. The specific goals of this task are to develop and build prototypes of two different radio science and astronomy modules that can be integrated into the UST EM: a bistatic radar receiver slice and a low-frequency, planetary emissions receiver.

Anticipated Benefits

This development could enable future NASA missions that may not otherwise have the resources for a standalone instrument to collect planetary emissions or perform uplink bistatic radar observations through the use of a UST for both telecom and science purposes.

Primary U.S. Work Locations and Key Partners



Engineering Model of the Universal Space Transponder (UST).

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Organizations Performing Work	Role	Type	Location
★ Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	Iowa

Images



JPL_IRAD_Activities Project Image

Engineering Model of the Universal Space Transponder (UST).
 (<https://techport.nasa.gov/image/28081>)

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Center Independent Research & Development: JPL IRAD

Project Management

Program Manager:

Fred Y Hadaegh

Project Manager:

Fred Y Hadaegh

Principal Investigator:

Michael Pugh

Co-Investigators:

Bruce G Bills
 Robert J Dengler
 Yonggyu Gim
 Curtis Jin
 Igor Kuperman
 Andrew F Romero-wolf
 Edgar H Satorius

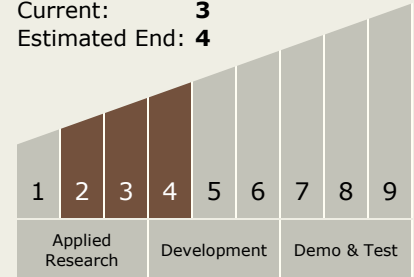
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Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **4**



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.4 Microwave, Millimeter-, and Submillimeter-Waves

Target Destination

Foundational Knowledge

Supported Mission

Type

Push